

Substance Abuse and Criminality

Rajita Sinha, PhD, and Caroline Easton, PhD

Substance abuse issues and the law have become intricately linked over the years. This article reviews the current research underlying the association between substance abuse and crime, and provides an overview of the pertinent issues in conducting a substance abuse evaluation in the forensic context. The epidemiology of substance abuse and crime is reviewed, exploring the association between crime and specific psychoactive substances. Clinical considerations underlying the association are discussed, with specific attention paid to the pharmacological effects of psychoactive substances and to the role of substance use in individuals with serious associated psychopathology. Diagnostic and etiological issues that are important in differentiating substance abuse from criminality are considered in the context of conducting forensic evaluations. Finally, key components of a forensic substance abuse evaluation are presented.

Substance abuse increases the likelihood of involvement with the law, and the link between substance abuse and criminal behavior is well-documented.^{1,2} In recent years, the rise in use of illicit substances has led to a growing number of drug-related arrests and convictions, with greater punitive consequences for drug-related charges.³ The rise in the number of drug-involved offenders has resulted in the overcrowding of prisons, a need for more jails, higher costs of maintaining arrestees, delays in processing court

cases, and greater demand for treatment services.

One of the predominant beliefs in the legal world is that criminals, because of their disregard of societal rules, become involved in the business of selling and using drugs and, therefore, need to be punished.³ The laws resulting from such views have been partially responsible for the higher rates of incarceration of drug-involved offenders. In contrast, the predominant view in the addictions field is that a majority of drug-involved offenders are drug abusers who become involved with the law because of their addiction. One of the key features of substance use disorders is the lack of responsibility of role obligations, be it family, work, or other social responsibilities.⁴ Greater chronicity of substance abuse, as evi-

Dr. Sinha and Dr. Easton are affiliated with the Department of Psychiatry, Yale University School of Medicine, New Haven, CT. Address correspondence to: Rajita Sinha, PhD, Associate Professor and Program Director, Substance Abuse Treatment Unit, Connecticut Mental Health Center, Department of Psychiatry, Yale University School of Medicine, 1 Long Wharf, Box 18, New Haven, CT 06511. E-mail: rajita.sinha@yale.edu

denced by excessive and compulsive drug use, leads to an increasing disregard for societal rules of functioning, often manifested by greater involvement with crime. A third more pragmatic and compromise viewpoint also has taken shape that acknowledges that substance abuse treatment works and that a majority of substance abusers need treatment and rehabilitation rather than incarceration alone. This has led to the development of several creative alternatives to incarceration.

While the number of programs that are alternatives to incarceration are growing, there are still fewer treatment slots and far greater numbers of drug-involved offenders who daily need to be sentenced. Within this context, forensic experts are being called on more frequently than ever before for sentencing purposes to help the criminal justice system decipher the diagnosis and etiology of the offenders and to provide judgments on whether rehabilitation is possible or not and whether future criminal behavior is inevitable. The goal of this article is to present the current research underlying the significant association between substance abuse and crime and to provide an overview of the pertinent issues involved in conducting substance abuse evaluations in the forensic context. A brief review of the epidemiology of substance abuse and crime is first presented, followed by a discussion of the clinical issues that bear on the significant association between substance abuse and illegal behaviors. Next, the diagnostic and etiological considerations that need to be taken into account when assessing a "criminal" versus a "sub-

stance abuser" are discussed. Finally, the key components of a forensic substance abuse evaluation are presented.

Epidemiology of Substance Abuse and Crime

A review of the epidemiology of substance abuse and crime has produced some alarming statistics. Although crime rates have fallen steeply for six years in a row in the United States, jail and prison populations have expanded considerably, increasing the need for more prisons.⁵ This has been attributed directly to the significant rise in arrests and incarcerations for drug-related offenses. Estimates indicate that over 60 percent of individuals arrested are incarcerated for drug-related charges. Furthermore, 70 percent of arrestees test positive for an illegal substance at the time of the arrest, and most are estimated to be drug dependent at that time.⁵⁻⁷ These high rates of drug dependence indicate a significant need for treatment in the population. However, U.S. government statistics indicate that while 74 percent of state and federal inmates need treatment, only 15 percent are receiving treatment.^{7,8}

Given the alarming statistics, it is important to examine the association between crime and specific psychoactive substances. Alcohol abuse is highly prevalent among the criminal population. Prior to incarceration, inmates were found to be drinking daily, three times more frequently than in the general population.⁹ Crime and alcohol use are known to frequently co-occur, such that alcoholism has been identified as one of the most important problems associated

Substance Abuse and Criminality

with criminal behavior.¹⁰ Arrests for sale or possession of cocaine in one Florida county have increased by over 500 percent since 1983.¹¹ Crack cocaine-related charges are on the rise, and the greatest severity in sentencing occurs in cocaine-related charges.¹² Cocaine abuse is associated with an increased risk of paranoia, aggression, and violent behaviors.^{13, 14} With marijuana abuse increasing significantly among adolescents and young adults, it is not surprising that among youth referred to juvenile court those who test positive for cannabinoids commit twice as many felonies as those who test negative.¹⁵ Finally, heroin abuse has long been most commonly associated with drug-related arrests and property offenses, and less associated with violent and serious crimes.^{16, 17} These data suggest that recent drug use itself is a risk factor in increasing the likelihood of crime.

Clinical Considerations

Substance abuse and dependence are chronic, relapsing psychiatric conditions that require treatment and rehabilitation. As with any other psychiatric illness, relapses are associated with exacerbation of symptoms and significant decrements in psychosocial functioning.¹⁸ Two sets of variables bear critically on understanding the link between substance abuse and crime: First, the specific pharmacological effects of alcohol and drugs influence the behavior, cognition, and judgment of substance abusers and those who are not addicted but may be especially predisposed to crime; and second, the impact of substance use among individuals with serious

psychopathologies such as personality disorders, psychosis, organic brain syndromes, and developmental disorders. These issues are considered below.

The Effects of the Pharmacology of Psychoactive Substances In the setting of substance use, it is well documented that illegal behaviors occur most frequently during the acute intoxication phase.¹⁹⁻²¹ Alcohol is associated with increased aggression both in nonalcoholic and alcoholic individuals.²² Stimulants such as cocaine and amphetamines may cause agitation, anger, and psychosis, while marijuana and phencyclidine are known to cause perceptual distortions and grandiosity.^{4, 13} Research has shown that the acute effects of abusive substances alter brain functioning with associated changes in personality, behavior, cognition, and emotionality.^{4, 23, 24} In addition, the cessation of chronic use leads to neurochemical changes in the brain associated with acute and protracted withdrawal states that also impact on behavior and functioning.²⁵⁻²⁸ Table 1 presents the psychological and behavioral effects associated with commonly abused substances during the intoxication, acute, and protracted withdrawal states. Manifestation of specific symptoms in an individual may be related to a genetic predisposition to addiction, personality characteristics, or other psychiatric problems.

In addition to the behavioral and cognitive changes associated with intoxication and withdrawal, animal and human research has documented significant changes in the mesolimbic dopaminergic reward system of the brain after chronic drug use.²⁹⁻³¹ Further, this area of the

Table 1
Psychological and Behavioral Changes Commonly Associated with the Following
Substance-Induced States

Substance	Detection Period in Urine	Substance Intoxication	Acute Withdrawal	Protracted Withdrawal
Alcohol	3–10 hours	Mood lability—sadness, irritability, impaired judgement; impaired social/occupational functioning; inappropriate sexual/aggressive behavior; attention and memory impairment; incoordination	Insomnia; psychomotor agitation, anxiety, perceptual disturbances (hallucinations, illusions); dysphoria, autonomic dysfunction (sweating, pulse rate)	Anxiety, insomnia, autonomic dysfunction; dysphoric mood
Cannabis		Euphoria, with inappropriate laughter and grandiosity; sedation, lethargy; impaired judgement; distorted sensory perceptions; impaired motor performance	Irritability; anxious or depressed mood, nervous, tense, sleep disturbances, appetite change, tired, trouble concentrating, distorted sensory perceptions	Not well studied
1 joint/week	2 days			
3×/week	2 weeks			
Daily use	3–6 weeks			
Cocaine	5 hours	Euphoria or blunted affect; hypervigilance; anxiety; tension or anger; change in sociability; interpersonal sensitivity; paranoid ideation	Fatigue; insomnia/hypersomnia; increased appetite; psychomotor agitation or retardation; anhedonia; drug seeking	Fatigue; anxiety; dysphoric mood; drug craving; insomnia
Cocaine metabolites	2–4 days			
Opiates	1–2 days	Initial euphoria followed by apathy, dysphoria, psychomotor agitation or retardation, impaired judgement, impaired attention and memory	Anxiety, restlessness, irritability, increased sensitivity to pain; dysphoric mood; insomnia, increased achiness, drug-seeking behavior	Anxiety; insomnia, dysphoria, anhedonia drug craving
Heroin	1–2 days			
Codeine	1–2 days			
Methadone	2–3 days			
Sedatives/hypnotics or anxiolytics	2–6 weeks	Mood lability; inappropriate sexual or aggressive behavior; impaired judgement, memory and attention difficulties; incoordination	Insomnia, anxiety, autonomic hyperactivity; psychomotor agitation	Anxiety; insomnia, dysphoric mood
Phencyclidine (PCP)	2–8 days	Anxiety and fearfulness, depression, suspiciousness, distorted perceptions, or tactile illusions, delusions (bad trips), flashbacks, depersonalization, derealization, paranoid ideation, hyperactivity, impulsive acts, impaired attention	Not well studied	Not well studied

Substance Abuse and Criminality

brain has projections to the prefrontal and orbitofrontal cortex and to other areas of the limbic system that are linked to various cognitive functions such as memory, regulation of voluntary behaviors and movements, forethought, planning, and emotional reactivity.³²⁻³⁴ New evidence from brain imaging studies has indicated that acute substance use modifies functioning in the above brain regions and that prolonged drug use can cause pervasive changes that persist even after the cessation of drug use.

Altered brain functioning in the above-mentioned regions has been reported with acute intoxication with heroin,³⁵ cocaine,^{36, 37} alcohol,³⁸ and, more recently, marijuana^{39, 40} in chronic users. Cocaine abusers also show decreased receptor functioning in the dopamine system for up to 3 to 4 months postdetoxification, compared with healthy control subjects.^{41, 42} Further, cocaine craving in chronic cocaine abusers, even without the presence of the drug, activates brain regions that are involved in cognition, emotion, and memory processing,⁴³⁻⁴⁵ which suggests that cognitive functioning during states of drug-seeking may be significantly affected. While these data do not suggest a direct causal link between substance-related changes in the brain and criminal behavior, the above evidence suggests that brain functioning may be compromised during substance-related states. Thus, criminal behavior that occurs largely in the context of recent substance use in substance-dependent individuals should indicate a serious need for treatment and rehabilitation, alternatives

that are known to reduce criminal recidivism.⁷

The Role of Dependence Severity and Co-occurring Psychopathology A positive association between severity of substance abuse and frequency of illegal acts has been noted.^{46, 47} As dependence on a substance increases, there is increasing tolerance to the effects of the substance so that individuals are known to use larger amounts for longer periods of time. Using larger amounts for longer periods is associated with an increased likelihood that negative cognitive and behavioral sequelae will occur, which in turn can lead to greater risk of participation in illegal behaviors. Further, dependence on more than one abusive substance is very common,⁴⁸ with evidence indicating that substance abusers who commit crimes are known to abuse a wider range of substances compared with addicts who do not commit crimes.⁴⁷ For example, alcohol and cocaine addiction commonly co-occur, and cocaine abusers often report the use of alcohol to counter the negative acute effects of cocaine.⁴⁹ Whether the combined use leads to greater disinhibition or to increased aggressiveness during the crash from an alcohol-cocaine binge is not known. However, it is well known that alcohol- and cocaine-dependent individuals are more severely addicted with poorer psychosocial functioning, greater legal involvement, and worse treatment outcomes.^{50, 51} Similarly, alcohol and heroin addiction also commonly co-occur, and, more recently, the co-occurrence of alcohol and marijuana abuse has been associated with greater involvement in gang-related violent episodes.⁵²

Clearly, the combined pharmacological effects of substances need further examination, as does the association between multiple substance abuse and crime.

Finally, co-occurring psychiatric problems with substance abuse are known to significantly increase the risk and severity of illegal acts and crime.^{53, 54} In general, acute intoxication increases the likelihood of violence among individuals prone to impulsivity. These individuals may include those with personality disorders who may be especially at risk of violence during intoxication and withdrawal from psychoactive substances.⁵⁵ Among individuals with psychotic disorders, substance abuse comorbidity and medication and treatment noncompliance are associated with violent behavior and illegal acts.⁵⁶⁻⁵⁹ Finally, although they comprise a smaller group, individuals with organic brain syndromes and developmental disorders with specific impulse control problems may be at risk to commit aggression toward others.⁶⁰ These data suggest the need for the careful assessment of psychiatric history and comorbidity in drug-involved offenders as violence or criminality among the dually diagnosed population may not be attributable only to intoxication.

Diagnostic and Etiological Considerations

Forensic assessments often require the need to make judgments about the diagnostic picture of arrestees and to comment on their treatment needs and chances of success. Because of the significant association between substance abuse and crime, diagnostic differentia-

tion between substance abuse and criminality is challenging. While there are clear diagnostic criteria for substance use disorders, the diagnosis of criminality in psychiatric terms is most commonly based on the diagnosis of antisocial personality disorder (ASPD). However, problems in the reliability and classification of ASPD have been noted in the literature.⁶¹ In addition, a significant overlap in the diagnostic criteria of substance abuse and ASPD exists, leading to serious concerns regarding overdiagnoses of ASPD in substance abusers.⁶²⁻⁶⁵ Due to this overlap, ASPD diagnoses in substance abusers has not been found to have significant predictive value for either future criminality or negative treatment outcomes.^{64, 66, 67} Indeed, a judgment regarding the risk for future criminality only on the basis of an ASPD diagnosis in an addict can be risky, in that it increases the chances that substance abuse alone will be viewed by the law as criminal behavior requiring punitive consequences.

With a rise in juvenile arrests in general, and with the growing number of juvenile drug-related offenders, it is important to examine the diagnostic and etiological issues involved in assessing juveniles and young adults. Once again, there are problems associated with the diagnosis of conduct disorder (CD) among substance-abusing adolescents and young adults. DSM-IV criteria for ASPD require that individuals meet criteria for CD (before age 15) and subsequent ASPD. However, the diagnosis of CD (particularly adolescent-onset type) is complicated by early onset of substance

Substance Abuse and Criminality

use among adolescents. There is increasing evidence that early age of onset of substance use (in early adolescence) such as use of nicotine, alcohol, and/or marijuana is significantly associated with increased delinquency, greater participation in high-risk behaviors,⁶⁸⁻⁷³ and more progression to serious drug abuse.⁷⁰ However, substance use is not an exclusion in the diagnosis of CD, and exceedingly high numbers of juveniles meet the criteria for CD, which, once again, makes differentiation between criminality and substance abuse difficult among juvenile offenders. In general, for the diagnosis of both ASPD and CD, childhood age of onset of CD, early onset of regular substance use, and severity of substance dependence is more predictive of persistent antisocial behaviors and negative treatment outcomes.⁷⁴⁻⁷⁶

While the diagnosis of ASPD and CD remain problematic, psychopathy, as defined and measured by the revised Psychopathy Checklist (PCL-R),⁷⁷ is emerging as a discrete clinical entity. There is some evidence that this may be more precise and reliable than ASPD in identifying the subset of criminals who are at greater risk for both general and violent criminal recidivism.^{61, 65} A number of studies have shown that psychopathy is a reliable risk marker for criminal recidivism.⁷⁸⁻⁸⁰ However, because most current studies with adult and adolescent substance abusers continue to use ASPD/CD criteria in assessing negative treatment outcomes in substance abusers,^{67, 75, 81} the use of the PCL-R has not been validated in the substance-abusing population. Furthermore, it also has not

been established as a predictor of future criminality in adolescent populations. Clearly, future research using the PCL-R is needed to establish its use among these populations.

Substance Abuse Evaluations in the Forensic Context

There has been a dramatic increase in the number of substance abuse evaluations requested by the courts at presentencing and pretrial hearings. The primary goals of the substance abuse evaluation in this context are: (1) to make an accurate diagnostic assessment of substance abuse or dependence, criminality, and the relationship between substance use to other co-occurring psychopathology; and (2) to provide an assessment of treatment need and of potential benefit from substance abuse treatment. The former entails a comprehensive clinical assessment of substance abuse, which often can be tricky and requires the careful collection of materials from a variety of sources, including patient interviews, self-assessments, laboratory tests, collateral information, family information, previous treatment records, and assessment of motivation for treatment. Assessment of treatment need, intensity of treatment required, and potential benefit from treatment is difficult to assess as well, and reliance on clinical judgment and the completeness of history and collateral information can be important aspects of this determination. A patient report on motivation for treatment needs to be interpreted with caution as the patient may indicate greater interest in substance

Table 2
Key Components of a Forensic Substance Abuse Evaluation

<p>A. <i>Substance use history for specific substances</i> Pattern of use: frequency, amounts, and periods of use, including age of first use, periods of continued use, periods of abstinence, and recent and last use Signs and symptoms of intoxication and withdrawal (for each substance used) Symptoms of abuse and dependence, including periods of remission Substance abuse treatment history Objective laboratory indicators of use: urine, blood, or hair sampling</p> <p>B. <i>Negative consequences of substance use</i> Medical, psychological, family, and social consequences Legal consequences—comprehensive history of arrests; age of first arrest, type of arrest; substance use at time of arrests</p> <p>C. <i>Physical and mental status exam</i> Signs of acute intoxication, withdrawal, or delirium Physical assessment of recent or past intravenous drugs and effects of substance use on physical appearance and nutritional status Mental status assessment of affective/mood and thought disturbances Cognitive assessment of attention/concentration, memory, abstract reasoning, and problem solving</p> <p>D. <i>Assessment of comorbid psychiatric disorders</i> Sign and symptoms of Axis I and Axis II disorders Determination of primary psychiatric versus secondary psychiatric disorders Psychiatric treatment history</p> <p>E. <i>Family history and collateral information</i> Family genogram with attention to history of substance abuse and psychiatric illness Family history of legal involvement and violent behaviors Family interviews with relevant family/significant other contacts</p> <p>F. <i>Context variables</i> History of childhood or adult victimization Information on school performance, stressful life experiences, and socioemotional supports Sociocultural factors, including race, gender, and class-related information</p> <p>G. <i>Treatment need and potential benefit from treatment</i> Outcomes of previous psychiatric and substance abuse treatment episodes, via medical records Current and previous motivation to change substance abuse behaviors Assessment of level of substance abuse treatment needed</p>	
--	--

abuse treatment if it is viewed as an alternative to incarceration.

While a comprehensive review of how to assess substance abuse is beyond the scope of this article (see Schottenfeld and Pantalon⁸² for a review of the assessment of substance abuse), key components of the evaluation are listed in Table 2 and are briefly described below.

A. *Substance Use History.* In obtaining

the history of substance use and patterns of use, it is important to inquire specifically regarding all categories of psychoactive substances and to obtain data on specific substances in each class. The major categories include nicotine, alcohol, cannabinoids, stimulants, opioids, sedative-hypnotics and anxiolytics, and inhalants. Specific use of the different names for street drugs in the interview can elicit

Substance Abuse and Criminality

more accurate information from the patient. Data on the age of onset of each substance used, the frequency and amounts consumed, the route of administration, the periods of continued use, the heaviest use, recent use, any period of abstinence, and efforts to curtail and control use should be gathered. Overlap in the use of multiple substances should be noted. Specific symptoms of abuse and dependence need to be assessed, which requires familiarity with the symptoms of intoxication and withdrawal specific to each class of substances. Careful attention must be paid to the positive and negative consequences of substance use. Inquiring about positive consequences may be overlooked but is important because it provides information regarding the acute reinforcing effects of substance use for a particular patient.

Laboratory assessment of substance use by obtaining toxicology testing of blood, urine, or hair is considered essential in a substance abuse evaluation. It provides an objective indicator of drug use and, therefore, can be a validity check on information provided by the patient. Knowledge of the detection period in urine, blood, or hair for each substance is essential (Table 1 provides information on urine detection period for commonly abused substances), as is an understanding of the sensitivity of the assays used and the substances that can be detected by the assays.

B. Negative Consequences of Substance Use. The medical, psychological, emotional, and social consequences of substance use should be elicited with specific examples of types of consequences.

A comprehensive history of the legal consequences of substance use is also very important. The assessment should include a history of prior arrests, age at first arrest and at subsequent arrests, type of arrests, data, if available, on whether the patient was intoxicated or high at the time of the arrest, nature of crimes committed while the patient was under the influence and those committed while they were not under the influence of psychoactive substances, and, finally, the chronicity of criminal behaviors.

C. Physical and Mental Status Exam. The patient interview also should contain a physical and mental status examination directed at detecting signs of acute intoxication, withdrawal, or delirium. This requires familiarity with the signs and symptoms of intoxication, withdrawal, and delirium associated with specific substances. A brief physical assessment should be conducted to look for evidence of recent or past intravenous drug use (e.g., track marks or abscesses) or the chronic use of drugs by insufflation (nasal discharge, ulcers, or perforated septum). Signs of fever, pallor, hypotension, or nutritional deficiency associated with alcohol or other drug dependence also can be noted. A careful mental status examination, including the assessment of cognitive functioning, also is essential in diagnosing substance use disorders, comorbid psychiatric illness, and cognitive dysfunction. This examination should include an assessment of transient or persistent hallucinations, mood or affective disturbances, and paranoid, suicidal, or violent ideation or behavior, and an indication of whether these symptoms

were secondary to substance abuse. Cognitive function assessment should include an evaluation of attention and concentration, recent and remote memory, abstract reasoning, and problem-solving ability. All of these may be impaired by recent alcohol, sedative, anxiolytic, stimulant, or polydrug use.

D. *Assessment of Comorbid Psychiatric Disorders.* Co-occurring psychopathology is highly prevalent among substance-abusing populations and must be carefully assessed. Particular attention should be paid to specific DSM-IV Axis I and Axis II disorder symptoms and their presence secondary to substance abuse. As shown in Table 1, various psychiatric symptoms can develop as a result of recent substance abuse, causing confusion in the diagnostic picture. The age of onset of specific Axis I disorders compared with the age of onset of substance use disorders can help to distinguish primary psychiatric disorders from substance-induced disorders. The diagnosis of a primary psychiatric disorder is more likely if the onset of the psychiatric disorder preceded the initial onset of substance use. A history of prior treatment of psychiatric disorders and benefit from treatment also should be documented. Finally, the careful assessment of Axis II personality disorders is important because differentiation between personality disorders and substance-induced personality changes can be difficult. Assessments of ASPD and psychopathy (by the PCL-R),⁷⁷ CD, borderline personality disorder, and mixed personality disorders along with the record of trouble with the law are

important in determining the risk of future criminal behaviors.

E. *Family History and Collateral Information.* A family history of substance use disorders and psychiatric illness can be useful in determining the diagnosis and etiology of the patient's psychiatric problems. If possible, interviews with family members or other people who have had contact with the patient in other settings can be helpful in obtaining corroborating data. The use of multiple sources can substantially increase the validity of the evaluation. In addition, obtaining medical records from previous psychiatric and substance abuse facilities also can provide pertinent information for the diagnosis and etiology of the patient's problem and their previous experiences with treatment.

F. *Context Variables.* Other relevant information regarding the patient's history includes history of childhood or adult violent victimization and data on school performance, stressful life experiences, social and emotional supports, sociocultural context, including racial, socioeconomic, gender and class related factors, should be gathered. These factors may contribute to understanding the patient's involvement with deviant peer groups, participation in violent behaviors, and/or initiation into regular substance use.

G. *Assessment of Treatment Need and Potential Benefit.* While the number of initiatives for alternatives to incarceration are growing, only one in eight substance-abusing offenders receive treatment in the criminal justice system.⁸ Thus, sentencing referrals from courts for a forensic evaluation often includes the question of

Substance Abuse and Criminality

whether the substance-abusing offender can benefit from treatment or, alternatively, whether the risks of placing the individual in the community are so high that incarceration will more likely benefit society. This determination should be based on a comprehensive picture of the patient's history. In addition, information on the patient's treatment history, whether previous substance abuse treatments were successful in helping the individual abstain from drug use for a significant period of time, and whether the patient showed motivation and readiness to change the drug-using lifestyle can be critical. More often than not, the offenders do not have a history of substance abuse treatment, and if the offenses have been nonviolent in nature, then a substance abuse treatment recommendation can be potentially beneficial to the individual. Even for violent offenders, if the substance use patterns indicate a clear and long history of substance dependence, the forensic expert can recommend in-jail substance abuse and/or dual-diagnosis treatment, which can be of tremendous benefit to society in the long run, once the offender is released.

In summary, the assessment of substance abuse in the forensic context can be a complex process, requiring substantial skill and knowledge both in clinical interviewing and in the conduct of substance abuse and psychiatric evaluations. In addition, knowledge regarding the effects of substance abuse on the brain and on functioning during various stages of the substance abuse cycle can significantly enhance the forensic expert's ability to integrate the various pieces of data

collected in the evaluation process and to make objective recommendations on the diagnosis, etiology, and treatment needs of drug-involved offenders.

References

1. Robbins LN, Tipp J, Childress A, Przybeck T: Antisocial personality, in *Psychiatric Disorders in America: The Epidemiologic Catchment Area Study*. Edited by Robbins LN, Regier DA. New York: The Free Press, 1991, pp 221-45
2. Monahan J: Mental disorder and violent behavior. *Am J Psychiatry* 47:511, 1992
3. Inciardi J, McBride D, Rivers J: *Drug Control and the Courts* (vol 3). Thousand Oaks, CA: SAGE Publications, 1996
4. American Psychiatric Association: *Diagnostic, and Statistical Manual of Mental Disorders* (ed 4 rev). Washington, DC: APA, 1994, pp 175-272
5. United States Department of Justice: National update. Bureau of Justice Statistics, No. 3, 1992
6. National Institute of Justice: Washington, DC: NIJ Reports, No. 215, 1989
7. Peters R: Substance abuse services in jails and prisons. *Law Psychol Rev* 17:85-116, 1993
8. U.S. General Accounting Office: Drug treatment: state prisons face challenges in providing services. GAO/HRD-91-128, Sept 20, 1991
9. U.S. Department of Justice: Criminal victimization. Bureau of Justice Statistics, 1988
10. Guze S, Wolfgang E, McKinney J, Cantwell D: Delinquency, social maladjustment and crime: the role of alcoholism (a study of first degree relatives of convicted criminals). *Dis Nerv Syst* 29:238-43, 1968
11. Allen S: High percentages of assaults, robberies are committed under the influence of crack. *St. Petersburg Times*, March 19, 1989, p 13
12. Egan T: The nation's war against crack retreats, still taking prisoners. *New York Times*, February 28, 1999, p 1
13. Yudovsky S, Silver J, Hales R: Cocaine and aggressive behavior: neurological and clinical perspectives. *Bull Menninger Clin* 57:218-26, 1993
14. Davis W: Psychopharmacologic violence associated with cocaine abuse: kindling of a limbic dyscontrol syndrome? *Prog Neuropsych-*

- chopharmacol Biol Psychiatr 20:1273-1300, 1996
15. Dembo R, Washburn M, Wish E, *et al*: Heavy marijuana use and crime among youths entering a juvenile detention center. *J Psychoact Drugs* 19:47-56, 1987
 16. Ball J, Schaffer J, Nurco D: The day-to-day criminality of heroin addicts in Baltimore: a study in the continuity of offense rates. *Drug Alcohol Depend* 12:119-42, 1983
 17. Nurco D, Ball J, Schaffer J, Hanlon T: The criminality of narcotic addicts. *J Nerv Ment Dis* 173:94-102, 1985
 18. American Psychiatric Association: Practice Guideline for Treatment of Patients with Substance Use Disorders. Washington, DC: APA, 1995
 19. Collins J, Hubbard R, Rachel J: Expensive drug use and illegal income: a test of explanatory hypotheses. *Criminology* 23:743-63, 1985
 20. Busch K, Schnoll S: Cocaine: review of current literature and interface with the law. *Behav Sci Law* 3:283-98, 1985
 21. Kermani E, Castaneda R: Psychoactive substance use in forensic psychiatry. *Am J Drug Alcohol Abuse* 22:1-27, 1996
 22. Jaffe J, Babor T, Fishbein D: Alcoholics, aggression, and antisocial personality. *J Stud Alcohol* 49:211-8, 1988
 23. Pickworth W, Rohrer M, Fant R: Effects of abused drugs on psychomotor performance. *Exp Clin Psychopharmacol* 5:235-41, 1997
 24. Azorlosa J, Heishman S, Stitzer M, Mahaffey J: Marijuana smoking: effects of varying delta-9 tetrahydrocannabinol content and number of puffs. *J Pharmacol Exp Ther* 261:114-22, 1992
 25. Grant I: Alcohol and the brain: neuropsychological correlates. *J Consult Clin Psychol* 55:310-4, 1987
 26. O'Malley S, Adams M, Heaton R, Rawin F, *et al*: Neuropsychological impairment in chronic cocaine abusers. *Am J Drug Alcohol Abuse* 18:131-44, 1992
 27. Pope H, Yurgelun-Todd D: The residual cognitive effects of heavy marijuana use in college students. *JAMA* 275:521-7, 1996
 28. Jentsch J, Redmond D, Elsworth J, Taylor J, Youngren K, Roth R: Enduring cognitive deficits and cortical dopamine dysfunction in monkeys after long-term administration of phencyclidine. *Science* 277:953-5, 1997
 29. Leshner A: Addiction is a brain disease, and it matters. *Science* 278:45-70, 1997
 30. Nestler E, Aghajanian G: Molecular and cellular basis of addiction. *Science* 278:58-62, 1997
 31. Koob G, Le Moal M: Drug abuse: hedonic homeostatic dysregulation. *Science* 278:52-8, 1997
 32. Fuster J: *The Prefrontal Cortex: Anatomy, Physiology and Neuropsychology of the Frontal Lobe*. New York: Raven Press, 1980
 33. Maclean P: *The Triune Brain*. New York: Plenum Press, 1990, pp 242-3
 34. Modell J, Mountz J, Beresford T: Basal ganglia/limbic striatal and thalamocortical involvement in craving and loss of control in alcoholism. *J Neuropsychiatry Clin Neurosci* 2:123-44, 1990
 35. London E, Broussolle E, Links J, *et al*: Morphine induced metabolic changes in human brain: studies with positron emission tomography and fluorine-18 fluorodeoxyglucose. *Arch Gen Psychiatry* 47:73-82, 1990
 36. Volkow N, Gillespie H, Mullani N, *et al*: Cerebellar metabolic activation by delta-9-tetrahydrocannabinol in human brains: a study with positron emission tomography and 18F-2-fluoro-2-deoxyglucose. *Psychiatry Res Neuroimaging* 40:69-78, 1991
 37. London E, Cascella N, Wong D: Cocaine-induced reduction of glucose utilization in human brain. *Arch Gen Psychiatry* 47:567-74, 1990
 38. Volkow N, Hitzmann R, Wolf A, *et al*: Acute effects of ethanol on regional brain glucose metabolism and transport. *Psychiatry Res Neuroimaging* 35:39-48, 1990
 39. Volkow N, Gillespie H, Mullani N, *et al*: Brain glucose metabolism in chronic marijuana users at baseline and during marijuana intoxication. *Psychiatry Res Neuroimaging* 67:29-38, 1996
 40. Mathew R, Wilson W, Coleman R, Turkington T, DeGrado T: Marijuana intoxication and brain activation in marijuana smokers. *Life Sci* 60:2075-89, 1997
 41. Volkow N, Fowler J, Wang G, *et al*: Decreased dopamine D2 receptor availability is associated with reduced frontal metabolism in cocaine abusers. *Synapse (NY)* 14:169-77, 1993
 42. Hammer R, Pires W, Markou A, Koob G: Withdrawal following cocaine self-administration decreases regional cerebral metabolic rate in critical brain reward regions. *Synapse (NY)* 14:73-80, 1993
 43. Grant S, London E, Newlin D, *et al*: Activation of memory circuits during cue-elicited cocaine craving. *Proc Natl Acad Sci USA* 93:12040-5, 1996

Substance Abuse and Criminality

44. Maas L, Lukas S, Kaufman M, USA: Functional magnetic resonance imaging of human brain activation during cue-induced cocaine craving. *Am J Psychiatry* 155:124–6, 1998
45. Childress A, Mozley P, McElgin W, Fitzgerald J, Revich M, O'Brien C: Limbic activation during cue-induced cocaine craving. *Am J Psychiatry* 156:11–8, 1999
46. Nurco D, Ball J, Schaffer J, Hanlon T: The criminality of narcotic addicts. *J Nerv Ment Dis* 173:94–102, 1985
47. Hammersley R, Forsyth A, Morrison V, Davies A: The relationship between crime and opium use. *Br J Addict* 84:1029–43, 1984
48. Helzer J, Pryzbeck T: The co-occurrence of alcoholism with other psychiatric disorders in the general population and its impact on treatment. *J Stud Alcohol* 49:219–24, 1988
49. Gawin F, Kleber H: Abstinence symptomatology and psychiatric diagnosis in cocaine abusers: clinical observations. *Arch Gen Psychiatry* 43:107–13, 1986
50. Carroll K, Rounsaville B, Bryant K: Alcoholism in treatment-seeking cocaine abusers: clinical and prognostic significance. *J Stud Alcohol* 54:199–208, 1993
51. Schmitz J, Bordnick P, Kearney M, Fuller S, Breckenridge J: Treatment outcome of cocaine-alcohol dependent patients. *Drug Alcohol Depend* 47:55–61, 1997
52. Dawkins M: Drug use and violent crime among adolescents. *Adolescence* 32:395–405, 1997
53. Kay S, Kalathara M, Meinzer A: Diagnosis and behavioral characteristics of psychiatric patients who abuse substances. *Hosp Community Psychiatry* 40:1062–4, 1989
54. Swartz M, Swanson J, Hiday V, Borum R, Wagner R, Burns B: Violence and severe mental illness: the effects of substance abuse and nonadherence to medication. *Am J Psychiatry* 155:226–31, 1998
55. Virkkunen M, Kallio E, Rawlings R, *et al*: Personality profiles and state aggressiveness in Finnish alcoholic, violent offenders, fire setters, and healthy volunteers. *Arch Gen Psychiatry* 51:28–33, 1994
56. Cuffel B, Shumway M, Chouljian T, Macdonald T: A longitudinal study of substance abuse and community violence in schizophrenia. *J Nerv Ment Dis* 182:704–8, 1994
57. Salloum I, Daley D, Cornelius J, Kirisci L, Thase M: Disproportionate lethality in psychiatric patients with concurrent alcohol and cocaine abuse. *Am J Psychiatry* 153:953–5, 1996
58. Swanson J, Borum R, Swartz M, Monahan J: Psychotic symptoms and disorders and the risk of violent behavior in the community. *Crim Behav Ment Health* 6:309–29, 1996
59. Swanson J, Estroff S, Swartz M, *et al*: Violence and severe mental disorder in clinical and community populations: the effects of psychotic symptoms, co-morbidity, and lack of treatment. *Psychiatry* 60:1–22, 1997
60. Brizer D, Crowner M (editors): *Current Approaches to the Prediction of Violence*. Washington, DC: American Psychiatric Press, 1989
61. Cunningham M, Reidy T: Antisocial personality disorder and psychopathy: diagnostic dilemmas in classifying patterns of antisocial behavior in sentencing evaluations. *Behav Sci Law* 16:333–51, 1998
62. Rounsaville B, Eyre S, Weissman M, Kleber H: The antisocial opiate addict, in *Psychosocial Constructs: Alcoholism and Substance Abuse*. Edited by Stimmeo B. New York: Haworth, 1983, pp 29–42
63. Spitzer R, Endicott J, Robbins E: Research diagnostic criteria: rationale and reliability. *Arch Gen Psychiatry* 35:773–82, 1978
64. Gerstley L, Alterman A, McLellan A, Woody G: Antisocial personality disorder in patients with substance abuse disorder: a problematic diagnosis? *Am J Psychiatry* 147:173–8, 1990
65. Cunningham M, Reidy T: Integrating base rate data in violence risk assessments at capital sentencing. *Behav Sci Law* 16:71–95, 1998
66. Abram K: The effect of co-occurring disorders on criminal careers: interaction of antisocial personality, alcoholism, and drug disorders. *Int J Law Psychiatry* 12:133–48, 1989
67. Brooner R, Herbst J, Schmidt C, Bigelow G, Costa P: Antisocial personality disorder among drug abusers. *J Nerv Ment Dis* 181:313–9, 1993
68. Kandel D: Stages in adolescent involvement in drug use. *Science* 190:912–4, 1975
69. Kandel D, Davies M: High school students who use crack and other drugs. *Arch Gen Psychiatry* 53:71–80, 1996
70. Kandel D, Chen K, Warner L, Kessler R, Grant B: Prevalence and demographic correlates of symptoms of last year dependence on alcohol, nicotine, marijuana and cocaine in the U.S. population. *Drug Alcohol Depend* 44:11–29, 1997
71. DuRant R, Knight J, Goodman E: Factors associated with aggressive and delinquent behaviors among patients attending an adolescent medicine clinic. *J Adolesc Health* 21:303–8, 1997
72. DuRant R, Smith J, Kreiter S, Krowchuk D: The relationship between early age onset of

- initial substance use and engaging in multiple health risk behaviors among young adolescents. *Arch Pediatr Adolesc Med* 153:286–91, 1999
73. Crowley T, MacDonald M, Whitmore E, Mikulich S: Cannabis dependence, withdrawal, and reinforcing effects among adolescents with conduct symptoms and substance use disorders. *Drug Alcohol Depend* 50:27–37, 1998
 74. Moffitt T: Juvenile delinquency and attention deficit disorder: boys' developmental trajectories from age 3 to age 15. *Child Dev* 61: 893–910, 1990
 75. Crowley T, Mikulich S, MacDonald M, Young S, Zerbe G: Substance-dependent, conduct-disordered adolescent males: severity of diagnosis predicts 2-year outcome. *Drug Alcohol Depend* 49:225–37, 1998
 76. Peters R, Kearns W, Murrin M, Dolente A, May R: Examining the effectiveness of in-jail substance abuse treatment. *J Offender Rehabil* 19:1–39, 1993
 77. Hare R: *The Hare Psychopathy Checklist-Revised*. Toronto: Multi-Health Systems, 1991
 78. Hart S, Kropp P, Hare R: Performance of male psychopaths following conditional release from prison. *J Consult Clin Psychol* 56:227–32, 1988
 79. Cornell D, Warren J, Hawk G, Stafford E, Oram G, Pine D: Psychopathy in instrumental and reactive violent offenders. *J Consult Clin Psychol* 64:783–90, 1996
 80. Serin R, Amos N: The role of psychopathy in the assessment of dangerousness. *Int J Law Psychiatry* 18:231–8, 1995
 81. Cacciola J, Alterman A, Rutherford M, Snider E: Treatment response of antisocial substance abusers. *J Nerv Ment Dis* 183:166–71, 1995
 82. Schottenfeld R, Pantalon M: Assessment of the patient, in *Textbook of Substance Abuse Treatment*. Edited by Galanter M, Kleber H. Washington, DC: American Psychiatric Press, in press, 1999